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## ARC MAPPING METHODOLOGIES & THE PURSUIT OF MAGICAL GLOBULES, NOTCHES, & BEADS: A BRIDGE TOO FAR TO ESTABLISH FIRE ORIGIN?

*By Thomas R. May, Esq. and David J. Icove, Ph.D.,  
P.E.*

“The witness stand is not a circus—there is no ‘Come One, Come All’ sign inviting anyone who wishes to speak to step right up. Instead, witnesses and their proposed testimony must meet certain requirements.”<sup>1</sup>

### I. INTRODUCTION

Expert fire investigators know the limits of arc mapping as an indicator of fire origin. Concerns about arc mapping are on the rise.

There are doubts associated with arc-related artifacts, distinguishing “cause” from “victim” beads, visual vs. microscopic examinations, and even practitioner qualifications. Specific noteworthy complaints include: (1) overpromises on the technique’s precision, (2) exaggerated inferences from the

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<sup>1</sup> Burgett v. Troy-Bilt LLC, No. 12-25-ART, 2013 WL 3566355, at \*1 (E.D. Ky. July 11, 2013).

discussion on proficiency testing.”<sup>121</sup> “To date, no published research exists that measures the accuracy or error rate of any of these principles, much less a fire investigator’s ability to bring these factors together to figure out where a fire started based on the arc mapping methodology.”<sup>122</sup>

Many experts qualified in the field of metallurgy consider visual and tactile inspections standing alone to be an unreliable methodology and would require additional testing before reaching conclusions concerning electrical conductor damage. In *Meemic Ins. Co. v. Hewlett-Packard Co.*, the court found that an “[e]lectrical engineer’s proposed testimony that cause of fire was unknown manufacturing defect in printer’s power adapter would not assist jury, and thus was not admissible in action against printer manufacturer to recover for damages caused by fire, where engineer based his opinion on his visual observation that “damage [on power adapter was] much more severe than anything else,” rather than on any scientific or technical expertise.”<sup>123</sup>

At present, the significance of arc mapping imprecisions and limitations involving theory, techniques, and experimental verification demonstrate that it has limited capacity at best to establish an area of fire origin.

#### K. THE EXPERT HAS RELIABLY APPLIED THE PRINCIPLES AND METHODS TO THE FACTS OF THE CASE.

The relevant issue is whether a so-called-expert can reliably determine the cause of a post-fire metallic artifact through visual or tactile methods. As stated previously, arc mapping is subject to ongoing scientific debate because the techniques are supported by limited historical data and only a few case reports which contain significant inconsistencies and

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<sup>121</sup> Gregory E. Gorbett & Wayne Chapdelaine, *Scientific Method – Use, Application, and Gap Analysis for Origin Determination*, INT’L SYMP. ON FIRE INVESTIGATION SCI.& TECH., at 10 (2014).

<sup>122</sup> Parisa Dehghani-Tafti & Paul Bieber, *Folklore and Forensics: The Challenges of Arson Investigation and Innocence Claims*, 119 W. VA. L. REV. 549, 560 (2016).

<sup>123</sup> *Meemic Ins. Co. v. Hewlett-Packard Co.*, 717 F. Supp. 2d 752, 767 (E.D. Mich. 2010).